solplan review

the independent newsletter of energy efficient building practice

the drawing-room graphic services ltd.
box 86627 north vancouver b.c. V7L 4L2

No. 1 February 1985

INSIDE....

Well built energy efficient houses can be much quieter, healthier and comfortable than traditional houses. Efficiency need not affect lifestyle (other than reducing operating costs). Energy efficient houses with heating needs as low as 10% or less that of comparable older houses are now being built.

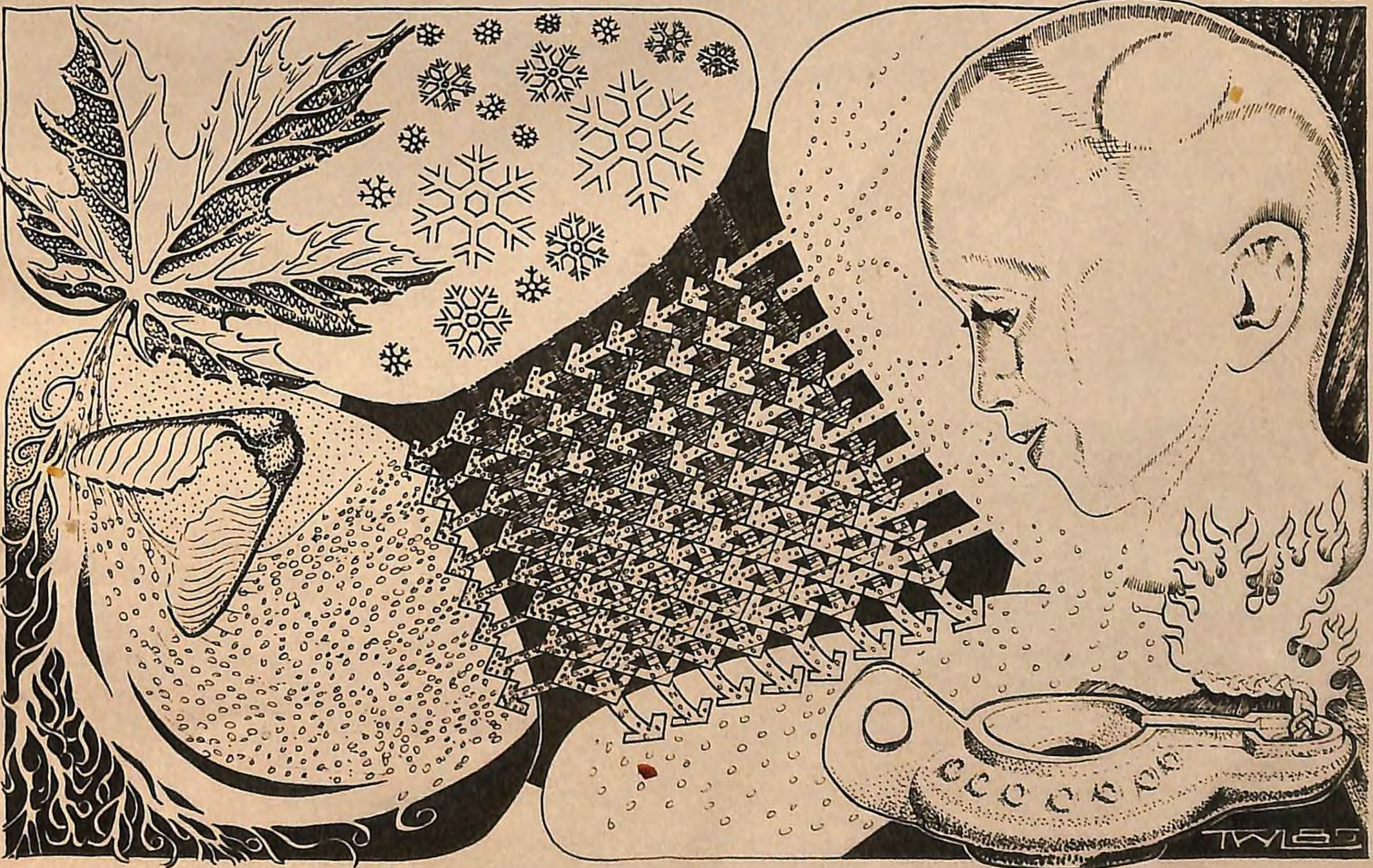
The technologies and products used in energy efficient homes are understood but refinement of products and techniques continues. In this, the premier issue of SOLPLAN REVIEW, we are focusing on indoor air quality issues (starting page 6) - identifying potential sources of indoor pollution and discussing means to provide fresh air without incurring penalties in heating bills.

Heat recovery ventilators (or air-air heat exchangers) are a new piece of mechanical equipment that has been developed for use in energy efficient homes. New standards for testing and installation are being developed. We discuss initial test results and what they mean.

Other stories include a commentary on the direction of the low energy building industry in Canada, product profile, and news of coming events.

CONTENTS:

From the publisher 2
Commentary 3
The ABC of Low Energy Building 5
Book Review 6
Are Air-Air Heat Exchangers Really Needed? 6
Indoor Air Pollution 7
Test Results: Heat Recovery Ventilators 8
Heat Recovery Ventilator Ratings ... 10
Installation Guideline for HRV's ... 11
Product Profile: ESWA heating foils . . 13
Publications 15
Coming Events 16



FROM THE PUBLISHER

Energy efficent construction is becoming increasingly commonplace in Canada. More and more homeowners and prospective homeowners are demanding energy efficient features. Yet, low energy building is not quite in the mainstream of building. Many builders still hesitate to use the new technologies.

Homes are now being built that offer energy savings of up to 80% compared to houses built prior to the 1970's, without affecting the comfort, lifestyle or cost of construction. In fact, well built energy efficient houses tend to be quieter, healthier, and more comfortable than the more traditional houses - and without affecting lifestyle (other than reducing operating costs).

Some of the technologies and products used in these new homes are being refined. Widespread dissemination of this technology is needed to acquaint builders, tradesmen, and owners of the salient points and issues. It is our intention to provide coverage of current information on energy efficient building practice, news and information on new products, designs, standards, regulations, trends, events, as well as independent commentary on new developments.

By studying past activity, evaluating problems and failures as well as successess, we hope to advance knowledge. We encourage you to let us know what your concerns are, what information you need, how can we make SOLPLAN REVIEW a more useful tool for you. Your needs are the point of this publication.

We hope you will help make this a 2 way communication, and that we can rely on your help to let others know about SOLPLAN REVIEW. Let your friends and associates know about this publication, for we rely on subscriptions. While we will accept advertising, we do not want to submerge the editorial material in a sea of ads.

Richard Kadulski

PROBLEM FREE CONSTRUCTION: The answers on Moisture, Durability, Cost, Supervision.

A two day seminar presented by the originators of the Airtight Drywall Approach. Topics to be covered include:

* Problems with current housing
* Airtightness, energy efficiency and the control of moisture
* Exterior sheathings and siding
* The Airtight drywall approach
* Heating and ventilation strategies for new and retrofit houses
* Foundations for new and retrofit construction
* Foams and panels for residential and commercial construction
* Air sealing strategies for retrofits
* Cost saving strategies for new and retrofit construction
* Commercial construction
* Warm climate construction

The speakers are Joe Lstiburek (pronounced "Stee-brek") and Jim Lischkoff. Both are engineers and designers who are also builders with considerable research and practical exprience.

Vancouver, B.C.: April 11 & 12, 1985
Toronto, Ont.: April 18 & 19, 1985
Montreal, Que.: April 25 & 26, 1985

For more information about the seminars, and registration contact:

BUILDING ENGINEERING DESIGN CORPORATION
91 Scollard St.
Toronto, Ont. M5R 1G4
Tel: 416-927-7223

SOLPLAN REVIEW is published 6 times per year by The Drawing-Room Graphic Services Ltd. P.O.Box 86627, North Vancouver, B.C. V7L 4L2. Tel: 604-689-1841
ISSN: 0828-6574

COPYRIGHT 1985 by The Drawing-Room Graphic Services Ltd. All rights reserved. Reproduction without written permission of publisher is strictly forbidden. Transgressors note: we let loose the Godfather's helpers on those who don't take heed!

SOLPLAN is a registered trademark of The Drawing-Room Graphic Services Ltd.

SUBSCRIPTIONS: $24.00 per year in North America. Overseas rates on request.

Unsolicited contributions and manuscripts welcome. Include self addressed pre-stamped mailer if return requested. Publishers are not responsible for loss or damage of same.

Second Class Mail Registration Pending

COMMENTARY

The tale of two countries...or how Canada, true to its insecure nature, abdicates its leadership...

They do it to us every time! The U.S. (at least the Northwestern U.S.) has caught up and far surpased Canada in its energy efficient housing industry - and Canadians, beaten again, sit back and wonder 'how do they do it?'

I'll tell you how they do it.

Two years ago an American professor of Architecture visited the Port Coquitlam Energy Information Centre and was astounded at the level of technology in residential airtight construction. A year ago, college construction teachers from Washington state came to B.C. for technical seminars. Over the past few years, Canadian energy efficiency experts were asked to provide technical expertise in training seminars for American utility companies, contractors and the trades.

And Canadians smiled smugly.

Meanwhile, Americans were busily working behind the scenes. The Northwest Power Planning Council (with members from Idaho, Montana, Oregon and Washington) was set up in April 1981 to establish a plan for regional energy conservation and electric power. And we're not just talking residential conservation. They were given two years to draw up this plan. Two years later, a two volume Northwest Conservation and Electric Power plan was produced.

They moved fast. The plans were well thought out. They developed a plan that would remain flexible with the changing needs of the area.

The council established a model conservation standard for new homes, specifying only the maximum electric energy use allowed for space heating. Depending on which of three climate zones the home would be built in, an electrically heated single family dwelling had to meet a performance standard of 2, 2.6, or 3.1 kwh/sq.ft./year.

And this will all become code requirements on January 1, 1986. Tacoma, Washington has already adopted this standard, one that meets or exceeds the requirements of the Canadian R2000 program. With seven simple goals encompassing energy supply and resource evaluation, they made it all happen in five years.

So what's been happening in Canada during this time?

In 1978 NRC published <u>Measures for Energy Conservation in New Buildings</u> which was a discussion paper of proposed code changes, which established recommended minimum levels of insulation, referred to sizing of heating equipment and glass/floor area ratio, and advocated increased airtightness.

In 1980 the Canadian Electrical Association set up the Double E program for new and existing homes with higher minimum requirements and included references to tighter windows, an R4 door, more efficient lighting and appliances, and recommendations for a continuously sealed air-vapour barrier. It wasn't until three years later that the Super Double E program for new homes added a performance requirement to its standards as well as controlled air supply. That same year training sessions for builders (an essential part of this new industry) prepared them for building the R2000 home, a program emphasizing house performance with a few prescribed features. Noteably, none of these standards have ever become Code.

In B.C., two programs remain: the Double E and what's referred to as the R2000/Super Double E. For a few years now, the Double E has been floundering, outclassed by its Big Brother, Super Double E, and slightly 'pock-marked' by complaints of excess moisture build-up and concern for air quality. The R2000 program started off with a splash in 1983. By the spring of 1984, however, things had almost ground to a halt, despite a press release stating that 50 million dollars was to be spent over the next 7 years to provide incentives for construction of 20,000 R2000 homes. A spurt of life appeared in late summer-early fall with three seminars held in B.C., and showed the promise of blossom when, in early December plans for 30 seminars were in the making. Unfortunately, only two R2000 seminars will actually take place in B.C. - one in Penticton and one in Vancouver, both in March. It looks like we're headed towards a spring grind again.

Even though over 100 low energy homes (R2000 and privately built custom homes to those standards) have been built in B.C. over the last few years, there's still many people who really aren't aware of energy efficient housing. And that's where a big difference comes into play. The marketing of energy efficient housing in Canada has been visibly absent. Reliable sources admit that with the last presentation to Treasury Board, 1 million dollars had been budgetted for marketting R2000 to the homeowner. However, when it was found that another budget item was left out, it took precedence over sales. On the other had, energy efficiency is high profile stuff in the N.W. U.S. .

In conjunction with Northwestern utilities, the Bonneville Power Authority has already started a major marketing and education program not only for builders, but for architects, real estate appraisers, code officials, lending institutions and homeowners under the Super Good Cents program. They're educating both the supply and demand sides. Further, after bantering the pros and cons of establishing a rating system for energy efficient homes in Canada, guess who has precisely that plan in mind?

What Canada needs is a plan for its residential energy efficient construction industry, and preferably for energy conservation. What becomes most frustrating when reading the N.W. Power Planning Council's publication is the fact that they have such a plan. They know now where they're headed in the conservation field. They have plans until the year 2002. These plans are sound, practical and relatively long term. Unless planning begins now, Canadians will begin looking to the United States for new technology. In fact, it's already begun.

Last year, I picked up a brochure on a new American product, a cross-laminated substitute for Poly. Last November I went to a technical seminar in Seattle put on by a relatively new organization the Energy Business Association of Washington. Energy efficiency is taking off in the States.

And Americans smile smugly as they get ready to export technology back into Canada.

Yvonne Kerr

Here's a heating idea you can really warm up to.

ESWA Radiant heating is a low energy system of thermostatically-controlled flexible heating elements sealed in plastic.

It is fully approved by CSA and heats a room by warming the objects in it, much like the way the sun heats the earth.

The result is that ESWA allows you to lower your thermostat without sacrificing comfort. And that means savings on your heating bill — 10% savings for every three degrees you lower your thermostat.

With the ESWA system there is:

- No furnace
- No filters to change
- No radiators, ducts, pipes, blowers or intricate wiring
- No energy-consuming parts to service
- No dust, condensation or fumes
- No start up and shut down noise

And all you need to install it is a staple gun!

Consumer and dealer enquiries are welcome. For the full ESWA story, contact:

National Heating Ltd.

9703 – 199A Street, Langley, B.C. V3A 4P8 • 888-3792

THE ABC OF LOW ENERGY BUILDING

Do you feel like you've stepped into an alphabet soup? Confused by the intials bandied about?

For the benefit for those who are confused by the initials for various agencies and programs involved with energy efficient building, we hereby present a glossary of terms. It contains information that is current up to the time of publication. Given the enthusiasm of government and bureaucracy to create new agencies and programs, it's hard to tell how long it will remain current. We hope that it helps to clear up any confussion you may have.

CEA: Canadian Electrical Association. An organization encompassing all of Canada's electrical utilities. It coordinates a number of research projects of interest to member utilities.

CHBA: Canadian Home Builders Association (formerly known as HUDAC). The major builder's trade association. A national organization with provincial sections.

CHIP: Canadian Home Insulation Program A federal government program to encourage energy conservation by providing financial assistance with the cost of upgrading insulation levels of older houses. The program will end in March, 1986.

CMHC: Canada Mortgage and Housing Corporation. Canada's national housing agency, responsible for the administration of the National Housing Act. The corporation conducts research into social, economic and technical aspects of housing and related fields.

CREO: Conservation and Renewable Energy Office. Outreach program of the federal department of energy, administers some department programs and aid in the dissemination of information. They have offices in each province and territory.

DBR: Division of Building Research, a division of the National Research Council of Canada, responsible for a wide variety of research into all aspects of building technology.

DOUBLE E: Energy Efficient Home Program. A program developed by the CEA and sponsored by its member utilities. It is a prescriptive program, spelling out minimum requirements concerning: thermal insulation, air-vapour barrier, ventilation, windows and doors, heating systems and appliances, regulating devices, lighting, and domestic water heater.

EMR: Energy Mines and Resources, the federal ministry responsible for Government of Canada policy and programs.

HOTCAN: A computer program for estimating the space heating requirements of residences, designed to run on most popular micro-computers. Developed by the NRC.

HOT2000: A version of the HOTCAN program that is being used in the R2000 program.

HUDAC: Housing and Urban Development Association of Canada - the former name of the CHBA.

NRC: the National Research Council of Canada.

R2000: Super Energy Efficient Program developed by EMR and HUDAC and supported by the CEA. An R2000 home is one designed and built within the energy consumption budget set out by the SEEH home guidelines. Such a home is part of a demonstration program promoted by EMR through the CHBA.

SEEH: Super Energy Efficent Home Program (or Super Double E)

SUPER DOUBLE E: Super Energy Efficient Home Program is a program developed by the CEA and sponsored by its member utilities. A qualifying home is designed to an energy consumption budget that falls within an annual limit of 10,600 kWh for lighting, appliances and domestic hot water, plus a maximum space heating energy consumption. The amount varies depending on location its climate. E.g.:

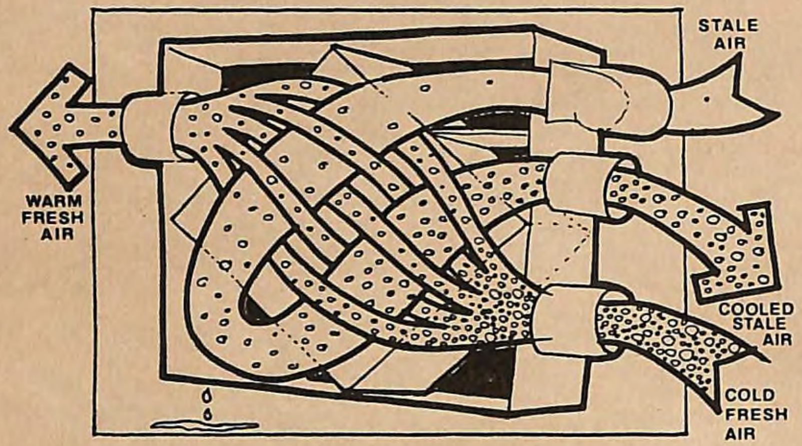
Vancouver: 28 kWhr/m² yr
Toronto: 36 kWhr/m² yr
Edmonton: 47 kWhr/m² yr

..to be continued

Solplan 6

AN AIR EXCHANGER FOR ENERGY EFFICIENT WELL SEALED HOUSES

By: R.W. Besant, R. Dumont, T. Hamlin, G. Schoenau. Illustrations: T. Lyster



Like any house, an energy efficient home generates its own indoor air pollutants. Reduced air leakage in 'air tight' houses means lower fuel bills and a more comfortable home, but it also means higher concentrations of indoor air pollutants and increased humidity levels. This factor was recognized at the outset of work on low energy energy buildings in Saskatchewan in the 1970's. To resolve these problems, a residential scale air exchanger was developed.

Members of the pioneering team developed do-it-yourself plans for an air-air heat exchanger. As a result of continuing work and experience with the original unit, the many commercial units now on the market, and continued interest in D.I.Y. plans, the plans have been totaly revised. The results have now been published as SOLPLAN 6.

<u>SOLPLAN 6: An Air Exchanger for Energy Efficient Well Sealed Houses</u> is a manual that a do-it-yourselfer can follow to build an air exchanger. It contains construction details, illustrated instructions, materials list, installation and flow balancing recommendations, and operating guidelines - and for those who decide not to build their own, a list of North American manufacturers.

SOLPLAN 6 is available for $6.95 plus 0.60 for postage from The Drawing-Room Graphic Services, P.O. Box 86627, North Vancouver, B.C. V7L 4L2.

ARE AIR-AIR HEAT EXCHANGERS REALLY NEEDED?

Air-Air heat exchangers are not mandatory to provide required and desireable fresh air into the house - you can always open a window or door or provide a simple fan to bring air inside. However, when it's -20°C it could be uncomfortable, not to say expensive.

Other ways to provide fresh air into the house are being considered, but in all cases you need to preheat the cold incoming air somehow before introducing it into the living areas.

The energy efficient house is a well built, air-tight house which will require controlled ventilation to meet health and safety requirements. If the house is not completely airtight and has a natural air change due to uncontroled infiltration of 1/2 the house volume or more each hour, no mechanical ventilation is needed.

However, uncontrolled infiltration is the single major source of heat loss in a house. Most common sources of infiltration are leaky doors, windows, electrical outlets, fireplace dampers, kitchen and bathroom exhaust fans, and furnace chimneys. In new construction, these are relatively easy to deal with if proper attention is paid to construction detailing. In existing houses, it is more difficult (but not impossible).

The residential heat exchanger or heat recovery ventilator (HRV) has been developed to preheat cold outside air as it is introduced into the house. Two flows of air, warm from inside the house, and cold air from outside pass each other in two separate channels. The temperature of each flow equalizes inside the heat exchanger, thus in a perfect thermal exchange the exhausted air has done about half the job of heating the incoming fresh air, recovering interior heat. The HRV, providing controled ventilation, also is a major mechanism for controlling indoor air pollution.

The HRV will only be of value if the house is tight and movement of air in and out of the house can be controlled. Equipment is now available to pressure test a house, to determine just how air tight it is. Houses built in the R2000 program must be pressure tested. (Such tests normaly cost about $150.)

INDOOR AIR POLLUTION

All homes generate air pollution indoors, even though we may not be aware of it. This pollution arises from a number of sources - construction materials such as particle board used for subfloors, furniture and cupboards, soil and gravel used in concrete and backfill, combustion equipment used in the house, and occupants (smoking, cooking, etc).

At low concentrations, these pollutants while unhealthy, will at most cause minor discomfort to the occupants. At high concentrations, some pollutants may be fatal.

In older houses, the amount of natural air leakage through the house was high, and the number of synthetic materials small, so that high concentrations of pollutants were unlikely to occur.

In new energy efficient construction, with an emphasis on air tight building practice, controlled ventilation must be provided. Revisions to the National Building Code of Canada (which will come into effect late this year) will require some form of controlled ventilation.

This table (reprinted from <u>SOLPLAN 6: An Air Exchanger for Energy Efficient Well Sealed Houses</u>) provides a summary of some typical pollutants that are found in the house, their sources, effects, and means for reducing them.

POLLUTANT	SOURCES	POSSIBLE EFFECTS	METHOD TO REDUCE POLLUTANTS
MOISTURE (Humidity)	Cooking, washing, clothes drying, breathing, plants etc.	Discomfort, condensation on walls & windows, mould or mildew growth, & structural damage (if humidity levels excessive).	Cover open water containers especially for cooking, use less water, vent dryers outside, etc.
FORMALDEHYDE GAS	Urea formaldehyde foam insulation & many types of plywood, particle board, panelling, carpets, furniture, textiles, etc.	Risk of eye & respiratory irritation & other health effects for people with allergic reactions, odors.	Avoid using &/or completely seal in particle boards & other materials with high urea formaldehyde base in glues. Vent new materials or rooms with these materials at a high rate for the first year.
RADON GAS	Soil (from where the radon can migrate into house basements) & sometimes concrete, sheetrock, other building materials, & well water.	Increased risk of lung cancer.	Seal cracks in basements, basement drains, etc.
TOBACCO SMOKE	Smoking	Increased risk of lung cancer & other respiratory ailments; heart disease; irritation of eyes, nose & throat; etc.	Avoid smoking & increase ventilation by a factor of five after exposure
HOUSEHOLD CHEMICALS	Household cleaning products various hobby supplies, paint solvents, hair sprays etc.	Various health effects: many household chemicals are toxic if concentrated, odors.	Use care in handling toxic chemicals & provide adequate ventilation during & immediately after their application.
OTHER ODORS VIRUSES, BACTERIA, DANDER & FUR	Humans & pets	Nuisance/annoyance plus risk of various health effects, particularly for susceptible individuals.	Provide adequate ventilation to all parts of the building.
COMBUSTION PRODUCTS (including carbon monoxide, nitrogen oxides, carbon dioxide, particulates, etc.	Fuel burning appliances including furnaces, combustion heaters, cook-stoves, clothes dryers, fireplaces, wood stoves, etc.	Irritation of eyes, nose, & throat; various minor & major health impacts. High concentrations of carbon monoxide are fatal.	Avoid open combustion flames &/or select only small air-tight units requiring small air flow rates & provide adequate ventilation.

TEST RESULTS

Efficiency tests of a series of commercialy available heat recovery ventilation (HRV) units were commissioned by the Federal Department of Energy Mines and Resources. The tests were performed by the Ontario Research Foundation, which was also involved in work drafting the CSA standards for HRV units.

Standard, 'off-the-shelf' units were purchased from retailers in late 1983 and early 1984. Testing, in accordance with the new standards, included measurement of actual airflows under external pressures of 50 and 100 Pascals (to simulate installed conditions - ducts, grilles, filters, etc.), cross contamination, cold weather performance, defrost mechanism effectiveness, etc. The data obtained is summarized in Table 1. (Manufacturer's comments to preliminary results have not yet been published).

There were some problems with the cold weather test. In the future such tests will be run for a longer period at a lower temperature.

This is the first major test of its kind. It provides valuable comparative performance data under identical conditions. It is safe to assume that the manufacturers, who received advance copies of the test results, have made or will be making changes and refinements to their products, so that this information may not represent currently available models. The results of these tests, and the availability of standards, should also lead to presentation of standardized performance data, making it easier for a purchaser to compare different units.

The performance of any HRV unit will only be as good as its complete installation, including ducts, dampers, controls, balancing, etc. The best rated unit, badly installed could give poorer results in place than a lower rated model well installed.

TABLE 1 HEAT RECOVERY VENTILATOR TEST RESULTS (Ontario Research Foundation)

MODEL MANUFACTURER'S SPECIFICATION	POWER CONSUMPTION	CROSS CONTAMINATION	NET VENT CAPACITY (L/s)		VENTILATION REDUCTION FACTOR COLD WEATHER TEST (%)		SENSIBLE RECOVERY EFFICIENCY		TEST COMMENTS
			50Pa	100Pa	SUPPLY	EXHAUST	0°C (%)	-20°C (%)	
AIR CHANGER DR-150 150 CFM Free Air flow(70 L/s) A, L, N	65	0.16	51	26	56	38	76	32	Unit did not completely defrost. No condensate during low temp. test.
AIR-X-CHANGE MODEL 502 (NUTONE) 200 CFM (94 L/s) B, M	125	0.04	82	60	34	45	75	58	Drive failure shortly after low temp. test was completed. Frost build-up on rotary wheel and case during low temp. test. No condensate during low temp. test.
BLACKHAWK 25 150 CFM max (70 L/s) C, L, N	245	0.16	41	26	15	4	40	50	
ENEREX U-HE101 46 L/s D, M, N	150	0.12	50	26	0	21	58	46	Defrost mechanism not activated during low temp test. Ice build-up in centre of core.
ENVIRO HEAT EXCHANGER NPR 265-6A 215 CFM @.05"WG (100 L/s)@12.5 Pa E, M, N	175	0.0	48	22	10	6	47	55	Severe frosting was observed on supply fan. Some ice build-up on core.
FAN EXCHANGER WR-25-5-2 90-210 CFM (42-100 L/s) F, M	90	0.27	54	47	0	0	22	36	Small frost build-up on case. Some ice build-up on the core.
LIFEBREATH 250 102 L/s @ 50Pa 87 L/s @ 100Pa G, M, P	250	0.07	85	70	0	7	48	33	Ice build-up on case during low temp. test.
PLX-240-PH 125 CFM @ 50Pa (60 L/s) H, M, Q	155	0.06	48	13	4	3	71	41	Condensation appeared on top and side of case during defrost test.
PLX-240-PH 125 CFM @ 50Pa (60 L/s) I, M, Q	160	0.0	71	41	0	15	61	36	Preheater remained on when unit was shut off. Condensate appeared in the plastic core and drain pan contained water at end of low temp. test.
STAR #200 0-200 CFM (0-94 L/s) D, L, N	66	0.03	48	27	23	4	69	56	Condensate appeared on defrost controller during defrost test.
vanEE R200 94 L/s @ 82Pa J, M, N	190	0.03	85	70	28	1	63	44	Unit was tested without filters except for low temp. test. Low temp. test carried out with exhaust filter only.
Z VENT 2020 57 L/s @ 50Pa K, M, P	170	0.42	29	16	1	4	67	43	Condensate and a small amount of ice found inside heater wiring box after low temp. test. Cross leakage appeared to be reduced during low temp. test.

Note that test results are for heat recovery ventilators which were available during late 1983 and early 1984 (purchased 'off the shelf' from retailers), and may not be representative of current production models.

The R2000 program requires an installed ventilation capacity of 47 L/s (100 CFM)

MODEL AND MANUFACTURER'S SPECIFICATIONS: Manufacturer's designation of unit tested. Some models may be available from other distributors with a different designation. Airflow rates from manufacturer's literature available at time test units were purchased.

POWER CONSUMPTION: (Watts @ 100Pa differential) Total electrical power consumption with fans on maximum speed setting, operating with a total external differential static pressure of 100 Pascals on the supply side.

DEFROST METHOD: Mechanism used to remove frost and ice from the unit, or to prevent the accumulation of frost and ice.

CROSS CONTAMINATION: (Exhaust air transfer ratio) Ratio of exhaust air in supply air flow to total supply air flow leaving HRV. When multiplied by 100, this gives percent of exhaust air returning in supply air.

NET VENTILATION CAPACITY: The minimum value of the exhaust or supply flow rate at 50 and 100 Pascals external differential static pressure. The amount of cross leakage (i.e. exhaust air which re-enters the building in the supply air) is subtracted to give the net flow.

VENTILATION REDUCTION FACTOR: Cold weather test: The percentage reduction in flow rate of the supply and exhaust air streams at the end of the 24 hour cold weather test, as compared to operation under non-frosting conditions. This reduction in flow results from frost and ice build-up in the core and shutdown of fans for defrosting.

SENSIBLE RECOVERY EFFICIENCY: The sensible energy recovered minus the supply fan energy and preheat coil energy, divided by the sensible energy exhausted plus the exhaust fan energy. This is the number that says what is actualy being recovered.

SUPPLY AIR: Fresh air entering building.

EXHAUST AIR: Air leaving building.

EXTERNAL DIFFERENTIAL STATIC PRESSURE: The difference in duct (static) pressures between the inlet and outlet of the HRV.

SENSIBLE ENERGY RECOVERED: The mass flow of the supply air multiplied by the temperature rise of the air and the specific heat of air. The airflow and temperature rise are corrected for crossleakage.

SENSIBLE ENERGY EXHAUSTED: The maximum of mass flow of either the exhaust air or supply air, multiplied by the temperature difference between the warm exhaust air and cold supply air, and the specific heat of air. The air flow is corrected for crossleakage.

CORE TYPE: A=plastic counterflow; B=Rotary plstic; C=plastic cross counterflow; D=plastic crossflow; E=heat pipe; F=capiliary blower; G=aluminum crossflow (double); H=paper single crossflow; I=plastic cingle crossflow; J=plastic double crossflow; K=aluminum counterflow.

FAN TYPE: L=axial; M=centrifugal

DEFROST METHOD: N=fan defrost; P=1000 Watt preheat; Q=1500 watt preheat

HRV RATINGS

Table 1 provides you detailed information about the various units on the market. While the information is important, for all practical purposes it is the information in Table 2 that can be used to select and install a specific unit.

Table 2 is the rating guide in use by the R2000 program. The efficiency rating numbers for the location and HRV unit are the ones to be used in the HOT2000 computer program. The data is derived from observed field measurements and laboratory tests.

TABLE 2

	NET VENTILATION CAPACITY (L/s)		HEAT RECOVERY VENTILATOR EFFICIENCY RATING (%) FOR HEATING SEASON NOVEMBER THROUGH MARCH											
	50Pa	100Pa	VANCOUVER, B.C. (3000 DDC)	WINDSOR, ONT. (3590 DDC)	TORONTO, ONT. (4100 DDC)	HALIFAX, N.S. (4120 DDC)	MONTREAL, QUE (4500 DDC)	ST. JOHN'S NFLD (4800 DDC)	QUEBEC, QUE (5000 DDC)	SUDBURY, ONT. (5400 DDC)	WINNIPEG, MAN. (5900 DDC)	SASKATOON, SASK. (6100 DDC)	WHITEHORSE YUKON (6879 DDC)	FT. SMITH N.W.T. (7300 DDC)
AIR CHANGER DR-150	51	26	75	72	71	73	67	72	64	60	48	48	45	32
AIR-X-CHANGER 502 (NUTONE)	82	60	75	73	73	74	72	74	71	70	65	65	62	57
BLACKHAWK 25	41	26	40	41	41	40	42	41	43	44	47	48	50	43
ENEREX U-HE101	50	26	57	58	58	58	58	58	58	57	53	52	49	46
ENVIRO HEAT NPR 265-6A	48	22	47	48	48	48	49	48	50	50	52	53	54	56
FAN EXCHANGER WR-25-5-2	54	47	22	23	24	23	25	23	26	26	30	30	32	36
LIFEBREATH 250	85	70	48	47	47	48	45	47	44	43	40	40	37	33
PLX-240-PH Paper core	48	13	71	70	70	71	67	70	65	63	56	55	51	42
PLX-240-PH Plastic core	71	41	59	59	59	60	57	59	56	54	47	47	44	40
STAR #200	48	27	66	67	67	67	66	67	65	64	60	60	57	53
vanEE R200	85	70	62	62	62	62	61	62	60	59	53	53	49	44
Z Vent 2020	29	16	64	66	66	67	64	67	63	62	55	54	50	42

1. These efficiency ratings are for use in the HOT-2000 computer analysis only.
2. This rating guide should not be used as the sole basis for selecting a heat recovery ventilator.
3. The summary of test results of heat recovery ventilators tested to CSA Standard C439 at the Ontario Research Foundation should be consulted for heat recovery ventilator airflow capacity and cold weather performance when selecting equipment.

INSTALLATION GUIDELINES FOR AIR EXCHANGERS

To obtain the maximum benefit from a heat recovery ventilator (HRV) it must be installed correctly. You can't assume that a contractor installed system will be done properly unless that contractor has had some exprience and is knowledgeable. Too many heating contractors install and 'design' heating systems by the seat of the pants method, without paying due attention to the fundamentals of good heating system design.

Traditionaly, heating systems are grossly overdesigned, to provide extra 'reserve' capacity to the system. Such systems are inefficient, but they do provide heat to the house so that the excess capacity, while expensive to operate, doesn't affect the occupants comfort. If the basic heating system is not designed with due care and attention, you can't automaticaly expect the HRV systems to be installed properly. HRV installations require careful attention to the system design and overall layout.

Even though many of the factors are common sense, many HRV installations in early demonstration houses had some sort of problem, which required corrective work even though the system was installed by heating contractors who were familiar with ducted systems. 90% of the first R2000 houses in Canada had unbalanced ventilation systems.

The following points to watch for in HRV installation are taken from a new draft CSA standard for Heat Recovery Ventilator Installation Guidelines.

* The system must provide a mimimum of 10 cfm (5 l/s) fresh air for each room of the house and be capable of delivering 1/2 air change per hour for the building.
* Duct runs should be kept as short as possible and minimize the number of bends.
* To reduce noise problems avoid a HRV unit near bedrooms or other quiet areas.
* Ensure HRV unit is located to allow for easy service access.
* When locating supply and exhaust duct hoods on the outside wall avoid locations where auto exhaust, dryer exhaust, gas service entries, septic vents, etc. could be drawn back into the house. Locate the ports above the local snow line.
* Mark which duct is intake, outlet.
* Never dump exhaust air into the attic space.
* Provide bird/rodent screen across outside ducts with a mesh no finer than 6mm (1/4 in).
* Do not connect unit directly to any combustion appliance. The HRV must not be counted on to provide combustion air to the furnace or fireplace. These appliances should have their own combustion air supplied directly.
* Do not connect unit directly to any clothes dryer, range hood, or heating system. (Use a recirculating hood filter for the range).
* All duct joints should be taped.
* Condensate drain pipe should be a minimum pipe size 1/2 in diamter.
* HRV and condensate lines must be located in a space where the temperature will remain above freezing point.
* Any ducts leading between the HRV and outside must be insulated with insulation (min. RSI 0.7 or R-4) with vapour barrier, to prevent condensation on the outside surface of the duct.
* Outside exhaust supply air hoods shall be a minimum of 6 feet apart, and at least 8 inches above finished grade.
* Balancing dampers must be installed to allow the flow rates to be balanced. The exhaust air leaving the building must equal the supply air entering the building as measured at the HRV within ±10% of balance point.
* The unit should be wired for continuous fan operation, with a control for high speed, controlled by an interval timer with manual override or a manual switch.
* All ductwork and wiring should be properly supported or clipped to prevent sagging or excessive movement.

(604) 433-5697

RESIDENTIAL VENTILATION

ENEREADY PRODUCTS LTD.

5892 Bryant Street • Burnaby, British Columbia • Canada V5H 1X6

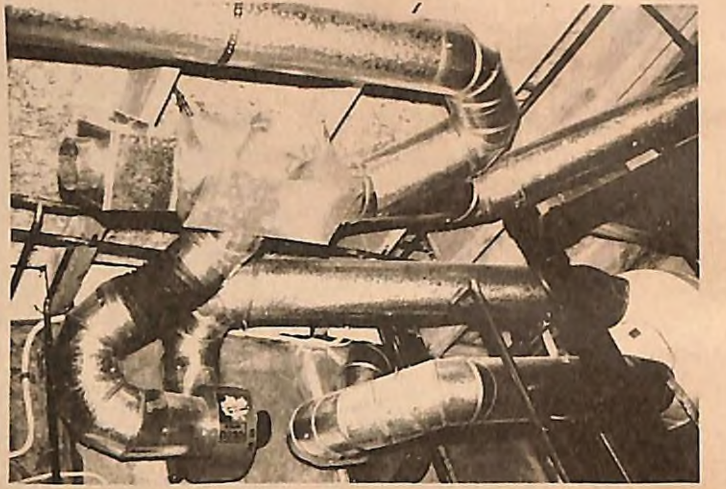
HOW NOT TO DO IT!

The installation of a heat recovery ventilator must be done carefuly, in accordance with manufacturer's recommendations and installation guidelines.

The following are a few items that were taken from a deficiency list, that in point form, went through 2 typewritten pages. The installation was done by a large reputable heating company in a major Canadian city.

* Intake hoods on outside wall not gasketed and caulked.
* No rodent screens on exhaust hood at outside wall.
* Vapour barrier on duct insulation was torn. Inspection not carried out after installation completed.
* Balancing dampers not installed (to allow flow rates to be adjusted after installation completed).
* Dryer vent connected through an exhaust hood without backdraft dampers. (Lint build-up behind the rodent screen would plug up duct, unless access was available).
* Duct joints were not taped and sealed.

A PIÇTURE IS WORTH 1000 WORDS!



Yes folks, this is a real installation in a real house, installed by an established heating contractor. To avoid incriminating the guilty, we will not identify the city in which this heat recovery ventilator is found.

Keep in mind the rule of thumb: one 90 degree elbow has a pressure drop equivalent to that of a 10 foot piece of straight duct. We wonder - was there any air flow at the end of these ducts?

ENCO DEVELOPMENTS LTD.
WILLIS GRAHAM, CET
PHONE 534-0421

R-2000
SUPER ENERGY EFFICIENT HOME PROGRAM
Energy, Mines and Resources Canada / Énergie, Mines et Ressources Canada

ENERGY EFFICIENT HOMES LTD.
WARREN JONES
PHONE 270-0312

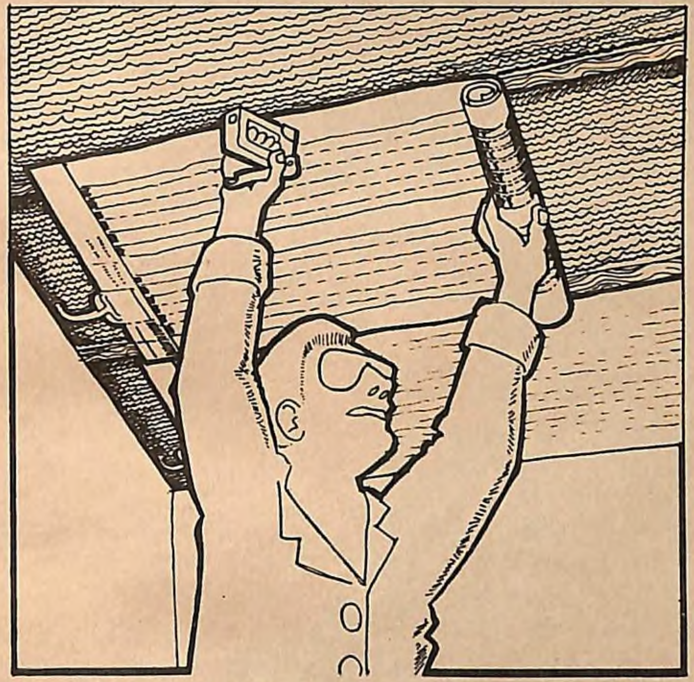
GREATER VANCOUVER Home Builders' Association

ARE YOU CONSIDERING THE PURCHASE OF A NEW HOME? IF SO, CONSIDER THE ALTERNATIVE OF HAVING YOUR NEW HOME DESIGNED TO SUIT YOUR EVERY NEED WITH THE BENEFITS OF AN ENERGY EFFICIENT AND A SAFE COMFORTABLE ENVIRONMENT. BOTH OF THESE BUILDERS OFFER YEARS OF EXPERIENCE WITH A DEDICATION TO EXCELLENCE IN THE DESIGN AND CONSTRUCTION OF TRUE CUSTOM HOMES. SERVICING THE LOWER MAINLAND. THEY OFFER COMPLETE PLANNING AND CONSTRUCTION SERVICES AS WELL AS CONSULTING SUPPORT.

NEW HOME WARRANTY PROGRAM OF BRITISH COLUMBIA AND THE YUKON
Registered Builder Member

GO WITH THE LEADERS IN R-2000 BUILDING

Where electric space heating is considered for a home heating system, an alternative to the conventional electric baseboard heating units are new electric radiant systems. This product profile describes one commercialy available system that has been used successfuly in Europe for a number of years and is now being introduced to Canada.



ESWA HEATING FOILS

A low temperature electric radiant heating system for ceiling installations.

<u>The ESWA heating elements</u> consist of a current-carrying metal foil embedded between sheets of plastic film, in standard widths of 30, 60, 90 and 120 cm (12, 24, 35 and 48 inches) each having free areas for fastening at 30 cm (12 in) centres. Standard widths of 40, 80 and 120 cm (16, 32 and 48 in) having free areas for fastening at 40 cm (16 in.) centres are also available.

Designed to operate at a nominal 230 volts, it can also be operated on other voltages. Furnished in power ratings of 125, 150, 175 and 200 watts per sq. meter (12, 14, 16 and 18 watts per sq.ft.)

For normal ceiling heights, max. 150 watts per sq.meter are to be used.

CODE APPROVALS

ESWA is approved for use in Canada (CSA approval no. LR 56397-1 Dec.1984). It has been tested by the Underwriters Laboratories (UL report no. ES 1128) and has ICBO approval no. 3364P (USA).

Ceiling heating installations shall be made according to provisions of Section 62 of the Canadian Electrical Code, Part I.

The manufacturer cautions that this equipment should only be installed by qualified personnel who are familiar with the construction and operation of the system and the hazards involved.

Warning notes must be provided, prominently displayed on the electrical panel stating that an electrified ceiling is supplied by branch circuits, and the ceiling must not be penetrated with nails, screws or similar devices. A further note must state that a potential fire hazard exists if additional materials are installed on the ceiling.

COST

The B.C. distributor quotes a retail, installed cost of approx. $1.00-1.50 per sq.ft. of floor area.

Operating costs should be same as or lower than similar electric radiant systems. B.C. Hydro is currently monitoring some Vancouver area installations.

INSTALLATION

Elements may be installed below joist or rafters before ceiling is applied; on an existing ceiling when a new ceiling is to be installed; above a new or existing ceiling; or on a dropped ceiling (also with resilient furring channel).

Installation must be made after the building is weatherproofed, and after all neccessary electrical installations completed and insulation have been attached. The ceiling elements are stapled onto the structure. The system has specially designed low profile fittings for connecting adjoining sections of material, minimizing special wiring needed to each heating element.

To protect the heating elements, ceiling materials should be installed immediately after ESWA elements have been installed and tested.

Thermal insulations must be carefully installed above all ESWA elements. (Preferably before ESWA installation). Insulation must be used above the heating element even if another heated floor area is located above as it gives the heat direction.

ESWA elements have not been tested for compatibility with chemical blown-in insulations such as cellulosic materials. Only non-metallic material can be used next to the element - be it for vapour barier or as part of insulation.

The ESWA system is most effective when the heating element is in contact with the ceiling finish material.

CEILING FINISHES

Approved finishes include: Plasterboard, plywood, wood. Paint finishes sensitive to temperatures of 40-50°C should not be used. Oil based paints are not recommended. Ceiling materials must be well dried before painting. ESWA installation should be switched off and cold during the application and drying of ceiling finishes.

PRODUCT ADVANTAGES

* No baseboards or ducts
* No dust or noise
* Individual room controls
* Comfortable even radiant heat
* Quick and easy installation
* Lightweight
* No mechanical room
* No special furring required
* Low density heat source, efficient for use where design heat requirements are small.

PRODUCT DISADVANTAGES

* No satisfactory evaluation of system with various controls presently available.
* Cannot provide heating to building during application of gypsum board ceiling finishes, and until such time as gypsum is completely dry. Must allow a minimum of one week with good drying conditions and two weeks in cold conditions before operating heating system.
* Proper drying procedures must be followed as the elements act as as a vapour barrier.
* Oil base paint on ceilings not recommended.
* As electric heating, operating costs could be high in areas with high electric rates.
* Damaged panel requires replacement. Could entail costly repairs if damage occurs after occupancy.
* Attention must be paid to subtrades not familiar with the system.

MANUFACTURER

Made in Norway by Standard Telefon og Kebelfabrik A/S, an ITT company

CANADIAN DISTRIBUTORS:

British Columbia
National Heating Ltd.
9703 - 103A St.
Langley, B.C. V3A 4P8
Tel: 604-888-3792

Manitoba, Saskatchewan:
Klug Construction Ltd.
2460 Ferrier St.
Winnipeg, Man. R2P 0G7
Tel: 204-338-7033

Quebec:
M. Yves Boucher
100 Les Guerets
Vandreuil sur le lac, Que. J7V 5V5
Tel: 514-455-3985

Newfoundland β Labrador:
SEA Marketing
P.O. Box 489
Mount Pearl, Nfld. A1N 2W4
Tel: 709-364-8090

In other provinces, contact the closest distributor above.

PUBLICATIONS

A National Catalogue of Residential Energy Conserving Products and Services has been prepared by the Canadian Home Builders' Association. The catalogue presents information about materials and services which are applicable to low energy housing, both new construction and retrofit. The emphasis is on manufacturer's of products, with reference made to distributors.

The primary audience for this catalogue are the builder-contractor and building supply house, but it will be equaly of use to architects, designers, engineers, specification writers, manufacturers, government agencies and owner builders.

Criteria for inclusion in the catalogue are included in the introduction to each section. In some instances, manufacturers are providing energy-efficient products as a matter of course, in which case only those manufacturers with special or new equipment are listed.

A valuable reference source, especially for those 'hard to find' items.

Copies are available for $3.50 plus $1.00 for postage from the nearest CHBA office. If an office is not accessible to you, forward your request to the SOLPLAN REVIEW.

. . . . AND COMING SOON:

The Port Coquitlam Energy Information/Action Centre is preparing an appendix to the National Catalogue of Residential Energy Conserving Products and Services.

This Appendix will provide a source list of B.C. manufacturers, distributors and retail outlets for hard to find energy conservation products. The B.C. Appendix will be available in late spring-early summer, 1985. SOLPLAN REVIEW readers will be advised you as soon as it is published.

Do you have an innovative building idea? an interesting energy efficient design? technical questions you want answered? Let us know.

VENTILATION
PRODUCT
SHOWDOWN

IT'S FREE!

ALL CANADIAN MANUFACTURERS OF AIR-TO-AIR HEAT EXCHANGERS HAVE BEEN INVITED TO THIS EVENT.

THE EVENING WILL INCLUDE:

- PRODUCT DISPLAY SHOW
  6:30 P.M. - 7:30 P.M.
- PRODUCT PRESENTATION AND SUPPLIERS' DEBATE
  7:30 P.M. - 9:30 P.M.
- PRODUCT DISPLAY SHOW
  9:30 P.M. - 10:30 P.M.
  COFFEE AND DONUTS!

THURSDAY, MARCH 7, 1985
FRASER VALLEY REAL ESTATE BOARD
15463 - 104TH AVENUE
SURREY, B.C.
TO REGISTER, CONTACT THE PORT COQUITLAM ENERGY INFORMATION/ACTION CENTRE

941-4328 (CALL COLLECT)

Minister - Pat Carney
Energy, Mines and Resources Canada

City of Port Coquitlam

richard kadulski architect
b.a., b.arch., m.a.i.b.c.
1269 howe st. vancouver, b.c. v6z 1r3
telephone: (604) 689-1841

climate adapted & energy sensitive design

IS THIS YOUR COPY OF SOLPLAN REVIEW? If not, why not subscribe today? Don't be out in left field - stay informed about developments in energy efficient building practice.

SUBSCRIBE TODAY!

1 year subscription to SOLPLAN REVIEW: $24.00/yr

☐ Please bill us

☐ Payment enclosed: $__________

☐ Please charge to:

VISA MASTERCARD AMERICAN EXPRESS

Card No. ______________________

Expiry date: ______________________

Signature:

NAME: ______________________

ADDRESS: ______________________

____

POST CODE ______________________

1L3

the drawing-room graphic services ltd.
box 86627 north vancouver b.c. V7L 4L2

COMING EVENTS

March 7, 1985: Ventilation Product Showdown. (Free) A no-holds barred discussion about specific air-air heat exchangers on the market. (see ad this issue). 6:30-10:30 pm. Fraser Valley Real Estate Board, 15463-104 Ave. Surrey, B.C.

March 15-16, 1985: R2000 builder's seminar, Sandman Inn, Penticton B.C. fee to be determined. For information: CHBA, 750-1441 Creekside Dr. Vancouver, B.C. Tel:604-732-1222

March 25, 1985: Breathing Easy in Low Energy Homes. A Free public information seminar, an introduction to energy efficient houses. 7:00-9:30pm, Sunnyside Community Hall, 1845 -154 St. Surrey, B.C.

March 29-30, 1985: R2000 Builder's seminar, Best Western Coquitlam Motor Inn, 319 North Rd. Coquitlam, B.C. Fee to be determined. For information: CHBA, 750-1441 Creekside Dr. Vancouver, B.C. Tel:604-732-1222

April 27-28, 1985: Sudbury Home Show, Sudbury Community Arena.

April 11-12, 1985: Practical Building Seminar, Sheraton Landmark, Vancouver, B.C. For details, Tel 426-927-7223. (See item page 2)

April 18-19, 1985: Practical Building Seminar, Sheraton-Centre, Toronto, Ont.

April 25-26, 1985: Practical Building Seminar, Hilton-Bonaventure, Montreal, Que.

NEXT ISSUE:

An alternative way to build an air tight house without polyethylene air vabour barriers. Find out about ADA (airtight drywall approach) in the next issue of SOLPLAN REVIEW. If it's proponents are correct, it will mean we have to drasticaly rethink the way houses are built!

The importance of quality control in energy efficient building to avoid vapour barrier poroblems.

More product reviews, news, etc.